# Objective of Diagnostic Research

Develop Scientifically Sound Diagnostic Tools and Models to Identify Stressors that Impact Waterbodies/Watersheds

• Total Maximum Daily Loading (TMDL) program in the U.S. requires all states to assess and categorize all water bodies within their boundaries. Across the US approximately 40,000 water bodies have been designated as impaired.

• States must develop plans for remediation of impaired sites. In order to do so, they must first identify the causes of impairment, e.g., nutrients, toxics, excess sedimentation, low dissolved oxygen
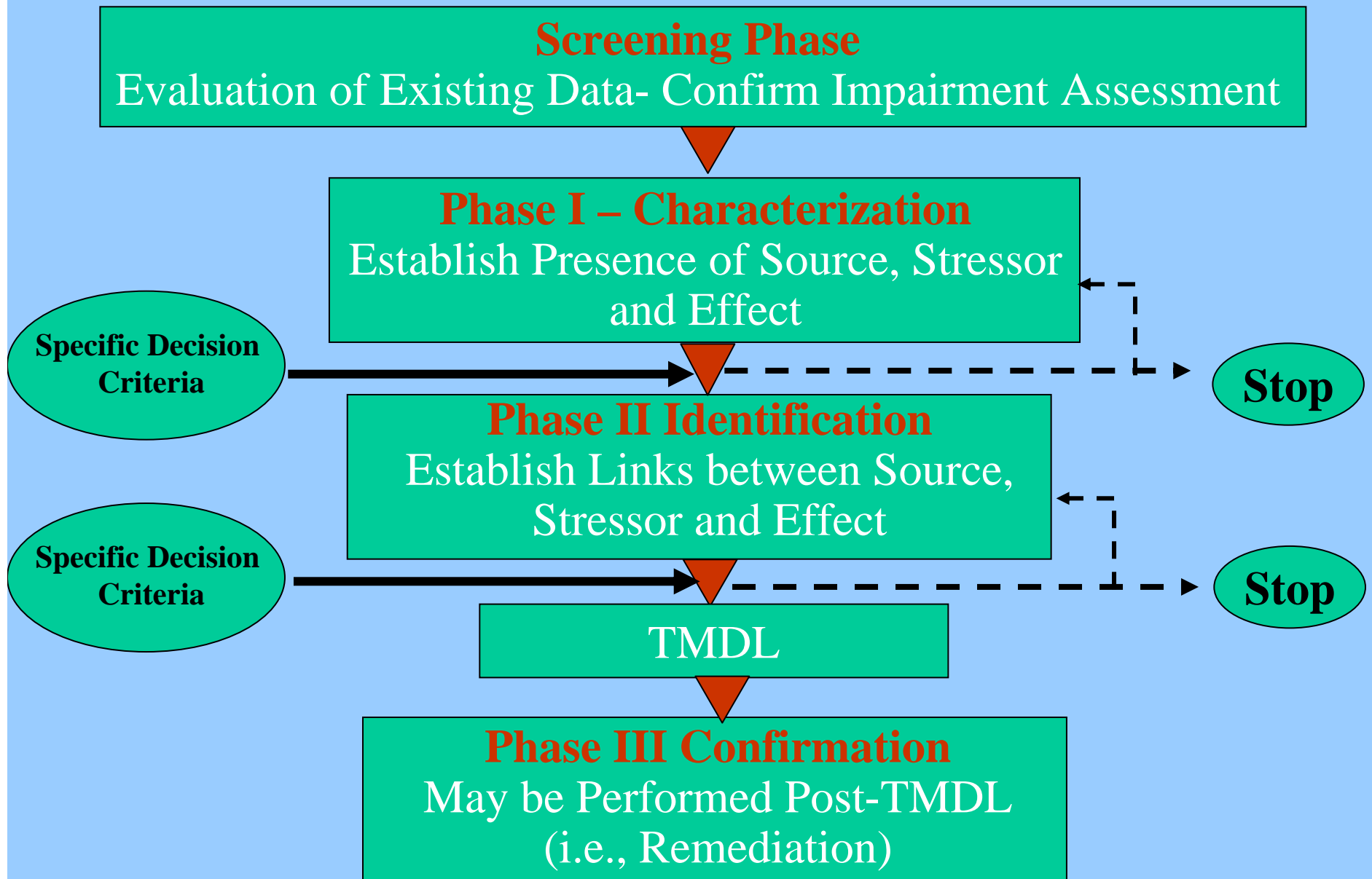
AED Diagnostics Case Study: Narragansett Bay

Objective: Tool Development, Scaling from Waterbody to Watershed
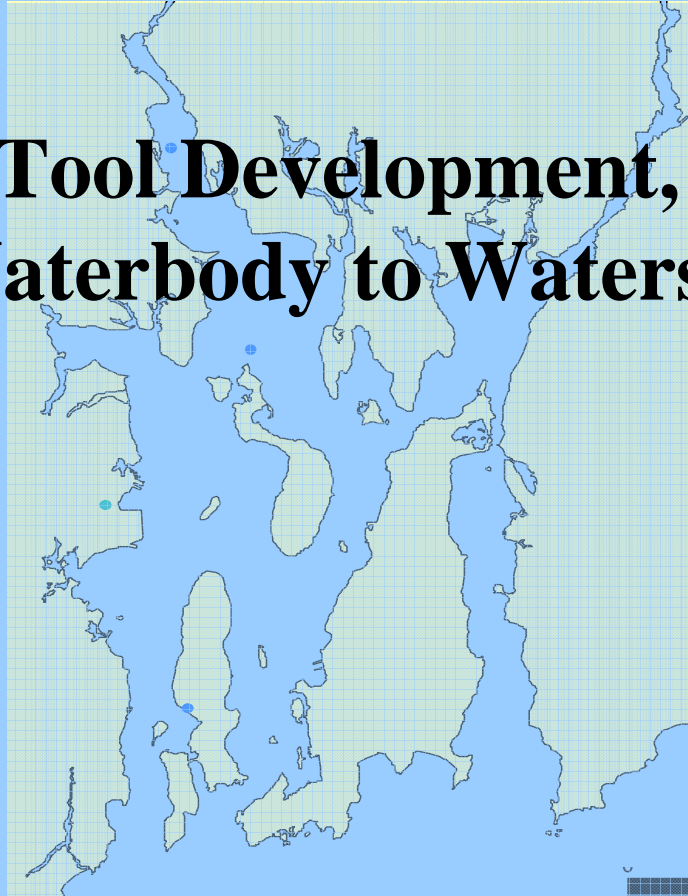
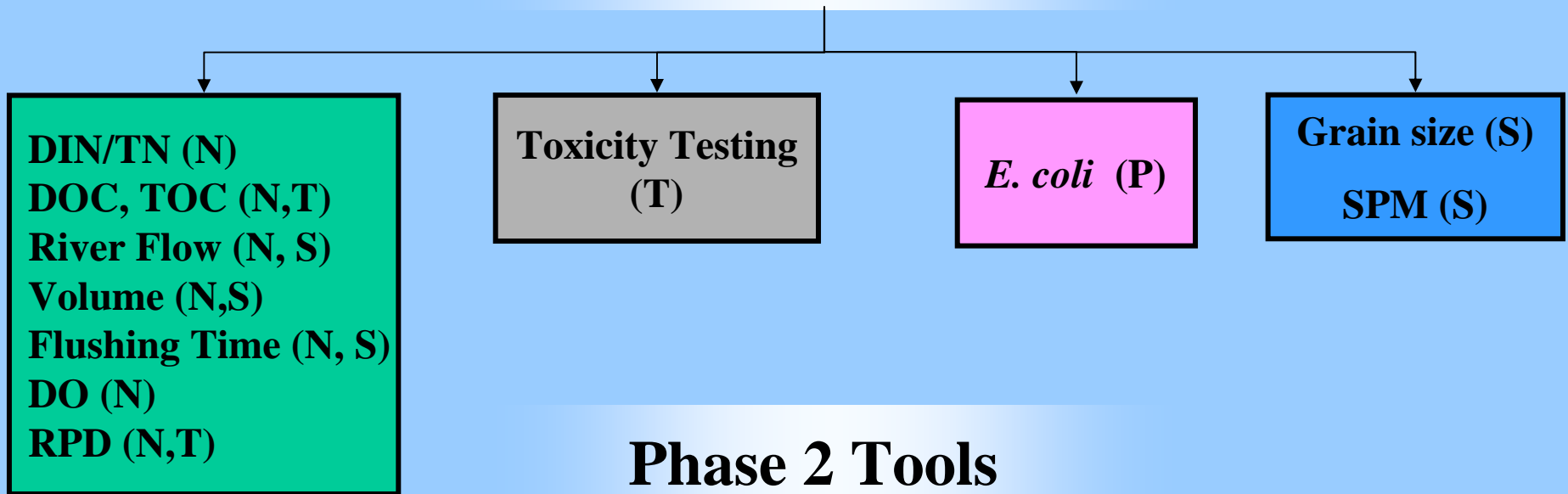Utilizes a 'Watershed TIE' or "Pollutant Identification evaluation (PIe)" approach:

- a tiered design which considers major groups of stressors and then uses experimentation & monitoring to eliminate non-significant stressors

AED Case Study: Overview and Approach

Screening Phase
Evaluation of Existing Data- Confirm Impairment Assessment

Phase I – Characterization
Establish Presence of Source, Stressor and Effect

Specific Decision Criteria

Stop

Phase II Identification
Establish Links between Source, Stressor and Effect

Specific Decision Criteria

Stop

TMDL

Phase III Confirmation
May be Performed Post-TMDL (i.e., Remediation)

AED Case Study: Example of Tools

Phase 1 Tools

DIN/TN (N)
DOC, TOC (N,T)
River Flow (N, S)
Volume (N,S)
Flushing Time (N, S)
DO (N)
RPD (N,T)

Toxicity Testing (T)

E. coli **(P)**

Grain size (S)
SPM (S)

Phase 2 Tools

Monitor
Nitrogen (N)
Phosphorus (N)
Chlorophyll a (N)
DO (N)

TIE (T)
Physicochemical measures (T)

Test Source (P)

Benthic Comm. Analysis (T,N)
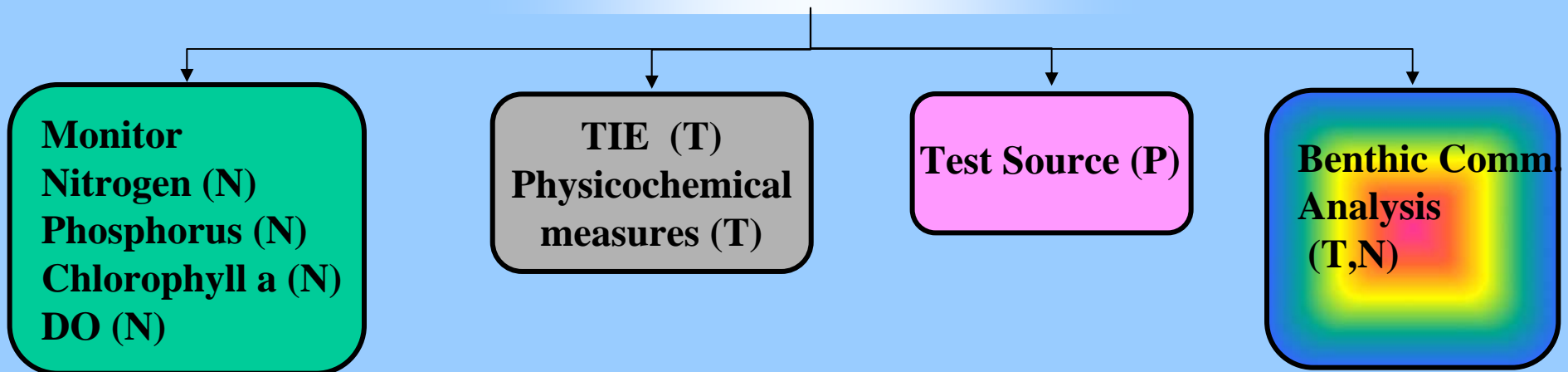
Research Needs

- **Identification, development and validation of Phase I and II diagnostic tools.**

- **Identification and development of factors in stressor-response relationships with diagnostic relevance.**

- **Development of data bases that demonstrate relationships between diagnostic measures and effects.**

- **Development of useful, predictive diagnostic model(s)**